Toxic Weeds

Many range plants are poisonous to livestock, and each year they cost ranchers substantial losses. In research on one of these killers, scientists at the Western laboratory first isolate and identify the toxic chemical in the plant. They then analyze the production of the poison throughout the plant's growing season and let ranchers know when the plant is most toxic. Ranchers can then prevent grazing in areas infested by the weed when the toxin is at a level dangerous to livestock.

As a second course of action, WRRC researchers look for an affordable way to control the weed. It is not unusual for a foreign weed to invade the United States and turn into a bigger pest here than it was in its native habitat. That's because in its homeland, its natural enemies, often insects, keep its population from getting out of hand. When the weed escapes to a new environment in this country, it may well flourish unchecked. One solution, first tried successfully 100 years ago, is to visit the weed's natural habitat, locate its natural enemies, and import them to the United States as agents of control.

In the first category is an American native, locoweed, a notorious poisoner of livestock that has killed tens of thousands of cattle over the years. Ranchers knew the plant was a killer for 100 years before a researcher at the Western center found that the alkaloid swainsonine was responsible for the poisoning. Its identification enabled scientists to predict its occurrence under various conditions and to recommend range management practices to control losses when livestock were exposed to the poison. Discovery of swainsonine has since led to the discovery of related alkaloids. One of these is believed promising in reducing infectivity of the AIDS virus (HIV) and is now being investigated at the National Institutes of Health.

The same WRRC investigator who identified swainsonine in locoweed has also found ways to measure the toxin levels of a class of alkaloids found in groundsels and ragworts, common weeds in the West. These toxins cause cirrhosis of the liver in livestock, but it has been called an iceberg disease since most of its effects are hidden; the animals usually succumb long after they have ingested the plants. Analysis of the plants at various growth stages revealed that toxin levels are at their greatest in the plants in the bud and early flower stages. Fortunately, these are easily recognizable by livestock producers, and they can take steps to keep their animals from grazing them. The analytical techniques developed for these weeds have become standardized internationally for this class of alkaloid, since groundsels cause livestock losses in many countries.

It was 100 years after locoweed was known as a cattle killer that WRRC scientists identified the poison as the alkaloid swainsonine.

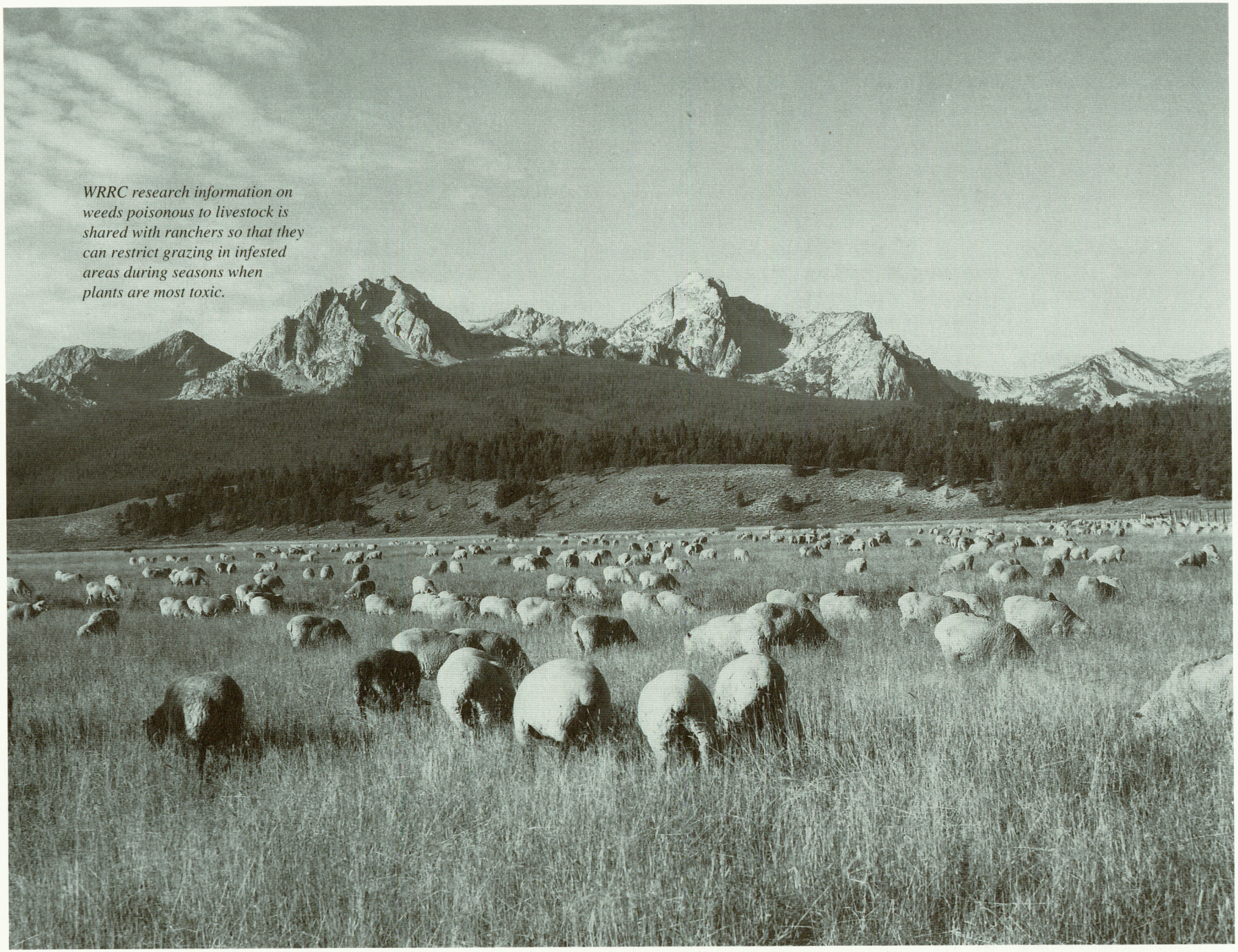
Western lab scientists have also charted seasonal variations in poison levels for tall larkspur, a poisonous plant that grows at high elevations, and for the bur buttercup. The latter plant brought about the sudden death in 1979 of 150 ewes in a fenced pasture in Utah.

In some instances, importation of insects to control toxic weeds has been successful. Two poisonous weeds, Klamath weed and tansy ragwort, ran riot in western U.S. pastures and rangelands after arriving from Europe. Imported insects got rid of 99 percent of both weeds in infested areas.

Recently, WRRC's war on weeds zeroed in on Washington State and Idaho, where 400,000 acres have been infested by a thorny invader, probably from the Middle East. Yellow starthistle, besides crowding out beneficial plants like alfalfa and stabbing the ankles of backpackers, is a horse-killer. The toxin from this plant attacks a horse's nervous system, either killing the horse outright or, even worse, locking up a horse's facial muscles so that it can neither eat nor drink.

So far, five insect enemies of yellow starthistle have been imported. One of the most promising is a hairy weevil discovered by U.S. entomologists in Greece. This is a case, say weed control experts, in which chemical herbicides are too risky or expensive to eliminate the weed.

—*Astragalus mollissimus* (wooly locoweed)



WRRC research information on weeds poisonous to livestock is shared with ranchers so that they can restrict grazing in infested areas during seasons when plants are most toxic.